



Primary Standards Laboratory Metrology Program

Fact Sheet

Thermodynamics

The Primary Standards Laboratory (PSL) maintains a wide variety of primary thermodynamic standards to assure accurate and traceable measurements for its customers. Capabilities include temperature, gas flow, and humidity.

All the primary thermodynamic standards are directly traceable either to the National Institute of Standards and Technology (NIST) or to fundamental quantities. Standard platinum resistance thermometers are certified by comparison to fixed temperature points at the argon triple point, mercury triple point, water triple point, gallium melting point, and the zinc, tin, and silver freezing point temperatures.

Type S thermocouples are also certified. Gas flow measurements can be performed over a wide range of flow rates from a few milliliters/minute to 3000 liters/minute for a variety of flow standards and devices.

Dew point can be measured to a few hundred parts per billion moisture and relative humidity from a few percent to 97 percent.

Capabilities

•TEMPERATURE <i>Platinum Resistance Thermometers</i>	-189°C to 660°C \pm 0.005°C
•THERMOCOUPLES Type S/R: 0 to 1100°C Base Metal	\pm 0.5°C to 2.2°C to ASTM specifications
•HUMIDITY 5% to 97% RH Frost/dew points	\pm 0.3% at 0 to 65°C \pm 0.4°C to -80°C



Triple Point of Water Cell

Gas Flow	Range	Uncertainty	Standards
Mass flow, nozzles, rotometers, laminar flow,	0.5 to 30 SCFM	0.24% (K=2)	Bell Prover
accumulation meters, turbine flow meters	10 ml to 50 SLPM	0.33% (K=2)	Brooks Flow Calibrator



Gas Flow Mass flow, nozzles, rotometers, laminar flow, accumulation meters, turbine flow meters	Range 0.5 to 30 SCFM 10 ml to 50 SLPM	Uncertainty 0.24%(K=2) 0.33%(K=2)	Standards Bell Prover Brooks Flow Calibrator
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Major Resources

- Fixed-point temperature cells
- Thunder two-pressure automated humidity system
- Thunder automated frost point generator
- Bell prover for gas flow
- Brooks system for gas flow



Gas Flow Calibration with Bell Prover

Contact

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